

Notice of Allowability

Application No.

10/521,807

Applicant(s)

IRIE ET AL.

Examiner

Art Unit

Henry S. Hu

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amendment of August 9, 2007.
2. ☒ The allowed claim(s) is/are 1-8.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

1. This Office Action is in response to **Amendment** filed on August 9, 2007. **Claim 7 was amended; all non-elected Claims 9-15 (Groups II-IV) were cancelled**, while no new claim was added. To be specific, Claim 7 was amended to overcome 112-2nd issue and with support to show that the iodine content is 10 ppm or less (see page 6 at middle section of Remarks). A single-paragraphed abstract has been submitted. The Examiner thereby withdraws specification objection and 112-2nd paragraph claim rejection. **Claims 1-8** with only **one** independent claim (**Claim 1**) are now pending. An action follows.

2. Claim rejections under **Non-Final** Office Action filed on May 9, 2007 are now removed for the reasons given in paragraphs 3-11 thereafter.

Allowable Subject Matter

3. Claims 1-8 are allowed.

4. The following is an examiner's statement of reasons for allowance: The above Claims 1-8 are allowed over the closest references:

5. The limitation of parent **Claim 1** in present invention relates to **a process for preparing a fluorine-containing polymer, which is a batch copolymerization process conducted under**

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conditions of reduced temperature of at least 0.95 and reduced pressure of at least 0.80 of the critical constant calculated from critical temperature, critical pressure and composition ratio of each monomer in the gaseous phase of the reaction vessel using “Peng-Robinson formula” as specified.

See other limitations of dependent Claims 2-8.

6. Applicants have now claimed in parent **Claim 1** an unexpected way of obtaining a fluorinated “copolymer” having few branched chains and little weight change in high temperatures (see abstract). The process is a batch copolymerization process specifically involved in two conditions including: (A) performing the copolymerization under “reduced temperature of at least 0.95” and “reduced pressure of at least 0.80” of the critical constant calculated from “Peng-Robinson formula” as specified, and (B) calculating the most suitable composition weight ratio of additional monomers and then adding such additional monomers (also see Applicants’ arguments on pages 7-9 of Remarks).

7. Applicants have detailed **the selection of polymerization temperature and polymerization pressure** in order to satisfy the above-mentioned conditions (A). Applicants also show the advantages (unexpected results) for the product when the polymerization satisfies condition (B). In order to satisfy condition (A), the pressures calculated from multiplying critical pressures calculating by Peng-Robinson formula need to be less than polymerization pressure, while the temperatures calculated from multiplying critical temperatures calculating by Peng-Robinson formula need to be less than polymerization temperature. After satisfying

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condition (B) for using additional monomers, such obtained polymer has little degradation for post-polymerization, and then it thereby can be effectively vulcanized.

8. Regarding parent **Claim 1**, each of three references including **Brinati, Enokida and Noda** may have disclosed a batchwise polymerization process for making fluoropolymers by using reduced temperature and reduced pressure. However, with Applicants' detailed calculations on pages 8-10, none of the three references describes or suggests the above-mentioned conditions (A). Additionally, **condition (B) cannot be applied to Noda** since excessive un-reacted monomers are discharged from the polymerization vessel (see page 11 at middle section of Remarks).

9. It is noted by this Examiner that even reduced temperature and reduced pressure are able to apply to copolymerization vessel, the pressures calculated from multiplying critical pressures calculating by Peng-Robinson formula may be still NOT less than polymerization pressure, while the temperatures calculated from multiplying critical temperatures calculating by Peng-Robinson formula may be still NOT less than polymerization temperature.

Therefore, all the three references including **Brinati, Enokida and Noda** in combination or alone cannot teach or suggest the claimed "copolymerization process".

10. After further examination and search, the examiner found the following prior art did not teach the claimed limitation:

US 6,806,332 B2 to Royer et al. or US 6,914,105 B1 to Charpentier et al. only discloses the preparation of continuous copolymerization in carbon dioxide medium (see abstract and title). **Peng-Robinson formula is briefly mentioned** (see "105" at column 14, line 57-58; see "332" at column 17, line 58-59), while fluorinated monomers are involved (see "105" at column 6, line 27-32; see "332" at column 5, line 57-62). However, **the process is NOT a batchwise polymerization.**

11. The key issue on the process of copolymerization to make fluorinated "copolymer" having few branched chains and little weight change in high temperatures, the above-mentioned two conditions (A) and (B) cannot be overcome by any or the combination of the above references, therefore, the present invention is novel.

12. As of the date of this office action, the examiner has not located or identified any reference that can be used singularly or in combination with another reference including the above references to render the present invention anticipated or obvious to one of the ordinary skill in the art. Therefore, the independent and parent process **Claim 1** is allowed for the reason listed above. Since the prior art of record fails to teach the present invention, the remaining pending dependent **Claims 2-8** are passed to issue.

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13. Any inquiry concerning this communication or earlier communication from the examiner should be directed to **Dr. Henry S. Hu** whose telephone number is **(571) 272-1103**. The examiner can be reached on Monday through Friday from 9:00 AM –5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan, can be reached on (571) 272-1119. The fax number for the organization where this application or proceeding is assigned is **(571) 273-8300** for all regular communications. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Henry S. Hu

Patent Examiner, art unit 1713, USPTO

October 10, 2007

/Peter D. Mulcahy/
Peter D. Mulcahy
Primary Examiner
Art Unit 1796